ChemQuest 70

Acid/Base Applications

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_\_

**Information: Common Acids and Bases**

As you know, the pH measures how acidic or basic a solution is. The pH scale ranges from 0-14. Here is a table of common acids and bases:

|  |  |
| --- | --- |
| **Acids (pH less than 7)** | **Bases (pH higher than 7)** |
| Nitric acid: HNO3 | Lithium hydroxide: LiOH |
| Sulfuric acid: H2SO4 | Sodium hydroxide: NaOH |
| Hydrochloric acid: HCl | Potassium hydroxide: KOH |
| Hydrobromic acid: HBr | Calcium hydroxide: Ca(OH)2 |
| Hydroiodic acid: HI | Strontium hydroxide: Sr(OH)2 |

**Critical Thinking Questions**

1. What do all of the acids in the above table have in common?
2. What do all of the bases in the above table have in common?
3. A certain solution has a pH of 2.75. Which of the following is probably dissolved in the solution?

A) NaOH B) H2SO4 C) NaCl

Explain your answer:

1. If a certain man’s pool had a pH that was too low and his plan was to add a little H2SO4 to the water to fix the problem, what advice would you give him?
2. Factories often let out pollutants such as sulfur oxides and nitrogen oxides into the air. The pollutants being released into the air are a leading cause of acid rain. Offer a hypothesis as to why those two gases in the atmosphere could lead to acid rain.
3. Acids and bases react together to neutralize each other. An acid will react with a base in a double replacement reaction. When an acid reacts with a base, water is formed as one of the products along with another compound. Write the balanced equation for the reaction between HCl and NaOH.
4. Write the balanced chemical equation for the reaction between nitric acid and calcium hydroxide.
5. Compounds that contain carbonate (CO3-2) react with acids to form carbon dioxide (CO2) and water and another compound. Complete and then balance the following equations:
   1. CaCO3 + HNO3 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_ + Ca(NO3)2
   2. CaCO3 + HCl 🡪
   3. Na2CO3 + HBr 🡪
6. Some lakes have a lot of limestone at the bottom. Limestone is primarily CaCO3. Given what you learned in the previous question, why would lakes that contain limestone not be affected very much by acid rain. Give it your best hypothesis.

**Skill Practice Questions**

1. Write the balanced equation for the reaction of hydrobromic acid and calcium hydroxide.
2. Vinegar (acetic acid, HC2H3O2) reacts with baking soda and lots of bubbles are produced.
   1. Which of the following is a possible formula for baking soda?

A) CaCl2 B) NaHCO3 C) NaOH D) Na2SO4

* 1. Production of bubbles is a sign that a gas is generated. Which gas?
  2. Some baking soda was dissolved in water. What is the pH of the solution?

A) 2.5 B) 9.8 C) 7.0

1. Write the balanced equation for the reaction of Na2CO3 with nitric acid.
2. Calculate the molarity of a solution formed by dissolving 23.4g of CaCl2 in 235 mL of solution.
3. What is the concentration of a solution formed by dissolving 25g of Al(NO3)3 in 120 mL of solution?
4. For the solution in the previous question, calculate the molarity of NO3- ions.
5. Calculate the following for a 0.0079 M solution of HNO3…

[H+] =

[OH-] =

pOH =

pH =

1. Calculate the pH of a 0.0047 M solution of Mg(OH)2.
2. A solution is formed by dissolving 1.25g of NaOH in 200 mL of solution. Calculate…

[H+] =

[OH-] =

pOH =

pH =